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The *Lapidicina* Group of the Wolf Spider Genus *Pardosa* (*Araneae, Lycosidae*)

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The *lapidicina* group of the genus *Pardosa* represents a homogeneous complex of eight species, most of which occur in the southwestern United States and in Mexico. Half of the species were described by early American workers at about the beginning of the present century. The inadequate descriptions and the close similarity of species have left the group in a confused and relatively obscure state. The purpose of the present study was to determine the number of species involved in the *lapidicina* complex, the diagnostic characters separating them, and the extent of their distribution in North America. Collections made in Mexico and the western United States over the past 15 years by the American Museum of Natural History have provided a wealth of material for study.

Four species were found to be new. *Pardosa sabulosa* Banks, 1898, although undoubtedly a member of the *lapidicina* complex, remains unknown. The type of this species was destroyed in the San Francisco earthquake, and the description could apply to any species of the group. On the basis of the type locality, Tepic, Mexico, it is presumed to be probably synonymous with one of the five species of the complex occurring in central Mexico.

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specimens from the Museum's collection on which this study is largely based. Acknowledgement is also due to Dr. Herbert Levi of the Museum of Comparative Zoölogy at Harvard College for the loan of material, including types and cotypes of Banks's *sierra, atromedia,* and *texana* from that collection.

The types of all new species are deposited in the collections of the American Museum of Natural History.

Definition of the *lapidicina* Group

The *lapidicina* complex presents a great many taxonomic difficulties because of its extreme homogeneity. All members of the group possess essentially the same color pattern, although it may vary in intensity. The carapace is brown and margined with a thin black line. Above the margin is a relatively wide submarginal pale band which is usually broken into four more or less equal blocks by downward extensions of dark brown from above. The ocular area extends back from the posterior eyes. Over the posterior declivity it narrows to one-half of its anterior width. The wider anterior portion of this band is usually constricted to form an hourglass pattern, and in the middle of the band just in front of the posterior declivity is a black longitudinal line. The clypeus and chelicerae are brown; the labium and endites are dusky but pale distally. The sternum and coxae may be pale, dusky, or black. The legs are annulate above, and only in very dark specimens does this annulation extend ventrally. The abdomen is brownish, with a basal hastate mark usually bordered with black dots. The dorsum bears scattered symmetrical maculations, while the sides of the abdomen are covered with numerous closely placed dark spots and dashes. The venter is pale.

Although each species exhibits a considerable range of intensity in coloration from very pale to very dark individuals, some species tend to be darker or lighter than others. Significant variations from the pattern described above are mentioned below under each species.

The *lapidicina* group also does not vary to any great extent in the structure of the carapace. The carapace is highest between the second and third eye row. It then slopes slightly to the posterior declivity in the posterior one-fifth of the carapace. The widest point is just behind the middle with evenly curved sides. The anterior median eyes are separated by approximately four-fifths of a diameter; the anterior laterals are three-fourths to one-half of the diameter of the anterior median eyes in size and separated from the latter by one-fifth of their diameter. The eyes of the second row are two to two and one-half times

the diameter of the anterior median eyes. The posterior eyes are only very slightly smaller than the eyes of the second row and are separated from the latter by one to two times the diameter of the eyes of the second row. The second eye row is one and one-half times the length of the first; the third eye row, twice the length of the first. The ocular area is wider than long, with the length varying from 75 per cent to 86 per cent of the width (measurements of ocular area length include the anterior median eyes). Order of leg length: 4:1:2:3.

The structure of the male palpal organ is the most valuable character for separating the species of the *lapidicina* group. All members of the complex possess a short, pistil-shaped, median apophysis (fig. 6, MA) on the tegulum (T). When viewed ventrally this apophysis is oriented at right angles to the long axis of the palp; however, the tip is actually turned ventrally (fig. 10). The shape of the median apophysis is too similar within the complex to be of much taxonomic value. The embolus (figs. 6, E; 7, E) is long and sword-shaped and lies above the median apophysis. Both the median apophysis and the embolus point towards three processes on the upper half of the bulb. These processes consist of a conductor, a median accessory process, and a lateral accessory process. The conductor (figs. 7, C; 12, C) covers and protects the tip of the embolus. In most species it is so thin and transparent that it is invisible in the unexpanded palp, but in *Pardosa valens* and *sierra* it is large and sclerotized and the most conspicuous of the three processes (figs. 29, C; 37, C; 38, C; 40, C). The shape of the conductor varies from a sword-shaped process (fig. 38) to a small fold (figs. 19 and 20). The median accessory process (figs. 6, M; 7, MO) is located lateral to the conductor. In many species of the complex, such as *lapidicina, mercurialis, vadosa,* and *fallax,* this is the conspicuous process in the unexpanded palp (figs. 16, 19–21). The third process, designated here as the lateral accessory process (figs. 6, L; 7, L; 23, L), is usually visible only in the expanded palp and is located on the edge of the bulb next to the median process. It is these three processes that are of the greatest diagnostic value in the differentiation of the various members of the complex. In addition to the processes described above, the upper angle of the bulb is bent ventrally to form a conspicuous tooth in most species of the group.

The structure of the female epigynum (fig. 9) is very similar throughout the complex, and as a result the female members of the group are much more difficult to separate than are the males. This difficulty is compounded by slight differences in degree of sclerotization within a species which produces a variety of configurations in the

epigynal details. The epigynum is shaped like an inverted T, with the upper rim distinctly sclerotized. The two halves of the transverse portion are separated by a narrow longitudinal ridge. This ridge may extend halfway or the entire length of the epigynum, but the extent of its length is too variable to be of taxonomic significance. The structure of the cleared epigynum (fig. 8) is the same throughout the complex. The openings of the tubules leading to the spermathecae are located on the sides at each end of the transverse portion. Each tubule is short and bends anteriorly and medianly to open into the spermathecae themselves. The latter are located in the middle or just above the middle and to each side of the longitudinal portion of the epigynum.

Pardosa lapidicina Emerton

Figures 1, 6–10

Pardosa lapidicina EMERTON, 1885, Trans. Connecticut Acad. Sci., vol. 6, p. 414, pl. 48, figs. 5, 5a, 5b, 5c (male, female). MONTGOMERY, 1903, Proc. Acad. Nat. Sci. Philadelphia, p. 652; 1904, *ibid.*, p. 272. CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 195, pl. 14, figs. 7, 8 (male, female). BRYANT, 1908, Occas. Papers Boston Soc. Nat. Hist., vol. 7, pp. 88, 89. BANKS, 1910, Bull. U. S. Natl. Mus., no. 72, p. 59. PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 571 (in part). GERTSCH, 1934, Amer. Mus. Novitates, no. 693, p. 19. COMSTOCK, 1940, The spider book, rev. ed., pp. 663, 664, figs. 731, 732. KASTON, 1948, Bull. Connecticut Geol. Nat. Hist. Surv., no. 70, p. 337, figs. 1129, 1143–1145, 2068 (male, female). LEVI AND FIELD, 1954, Amer. Midland Nat., vol. 51, no. 2, p. 456. ROEWER, 1954, Katalog der Araneae, vol. 2, pt. A, p. 192. BONNET, 1958, Bibliographia araneorum, vol. 2, pt. 4, p. 3379.

Pardosa obsoleta BANKS, 1892, Proc. Acad. Nat. Sci. Philadelphia, p. 71, pl. 3, fig. 45.

Pardosa venusta BANKS, 1892, Proc. Acad. Nat. Sci. Philadelphia, p. 69, pl. 1, fig. 42.

MEASUREMENTS: Total length: males, 6.30 mm. to 9.30 mm.; females, 6.37 mm. to 10.37 mm. Of a male from Lycoming County, Pennsylvania: Total length, 6.37 mm.; carapace: length, 2.96 mm., width, 2.41 mm., height, 1.19 mm.; sternum: length, 1.48 mm., width, 1.26 mm.; patella-tibia: first leg, 4.44 mm., second leg, 3.19 mm., third leg, 3.07 mm., fourth leg, 4.89 mm. Of a female from Lycoming County, Pennsylvania: Total length, 8.41 mm.; carapace: length, 4.89 mm., width, 3.04 mm., height, 1.85 mm.; sternum: length, 2.07 mm.; width, 1.70 mm.; patella-tibia: first leg, 5.44 mm., second leg, 5.15 mm., third leg, 4.81 mm., fourth leg, 6.22 mm.

Coloration in *lapidicina* is often much darker than in the western species, and the typical pattern may be obscured. However, very pale

specimens are also encountered. The structure of the carapace is typical, although the ocular area is relatively wide, the length being only 75 per cent of the width.

The male palp is characterized by a flattened, spatulate, median, accessory process (fig. 7, M). The conductor (C) is a thin transparent spur, and the lateral process is rounded. The median accessory process is the only one of the three that is conspicuous in the unexpanded palp and appears as a small, dark, rounded lobe (fig. 6, M). In midwestern specimens this process tends to become less spatulate and more hook-shaped, and as a result specimens from the Midwest are difficult to separate from *mercurialis* unless the palp is studied in the expanded condition.

The female epigynum is highly variable. The transverse portion is confined to the lower two-fifths to one-quarter of the length. The upper margin of the transverse portion is often indistinct and may meet the longitudinal portion at right angles or may gradually slope towards the sides. In specimens in which the upper margin is distinct and at right angles to the transverse portion, the epigynum is identical to that of *Pardosa steva* (figs. 28 and 32). In those in which the margin is indistinct, it may appear as in figures 8 and 9. When the epigynum is cleared the spermathecae can be seen lying just above the midline.

TYPE LOCALITIES: Salem, Massachusetts, and Meriden, Connecticut, cotypes in the Museum of Comparative Zoölogy.

DISTRIBUTION: *Pardosa lapidicina* occurs throughout the eastern half of North America, as shown in the map (fig. 1), and has been recorded as far west as Minnesota, Nebraska, and Kansas. It undoubtedly extends farther south in the Atlantic coast states than available records indicate. This species is the only member of the complex occurring in eastern North America, and present records are still too sparse to indicate the western boundaries or coexistence with any other members of the group.

Pardosa mercurialis Montgomery

Figures 1, 11–15

Pardosa mercurialis MONTGOMERY, 1904, Proc. Acad. Nat. Sci. Philadelphia, p. 270, pl. 19, figs. 20, 21 (male, female). BANKS, 1910, Bull. U. S. Natl. Mus., no. 72, p. 59. GERTSCH, 1934, Amer. Mus. Novitates, no. 693, p. 19. ROEWER, 1954, Katalog der Araneae, vol. 2, pt. A, p. 189. BONNET, 1958, Bibliographia araneorum, vol. 2, pt. 4, p. 3379.

Pardosa lapidicina Emerton, CHAMBERLIN, 1908, Proc. Acad. Nat. Sci. Philadelphia, p. 195 (in part). PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 571 (in part).

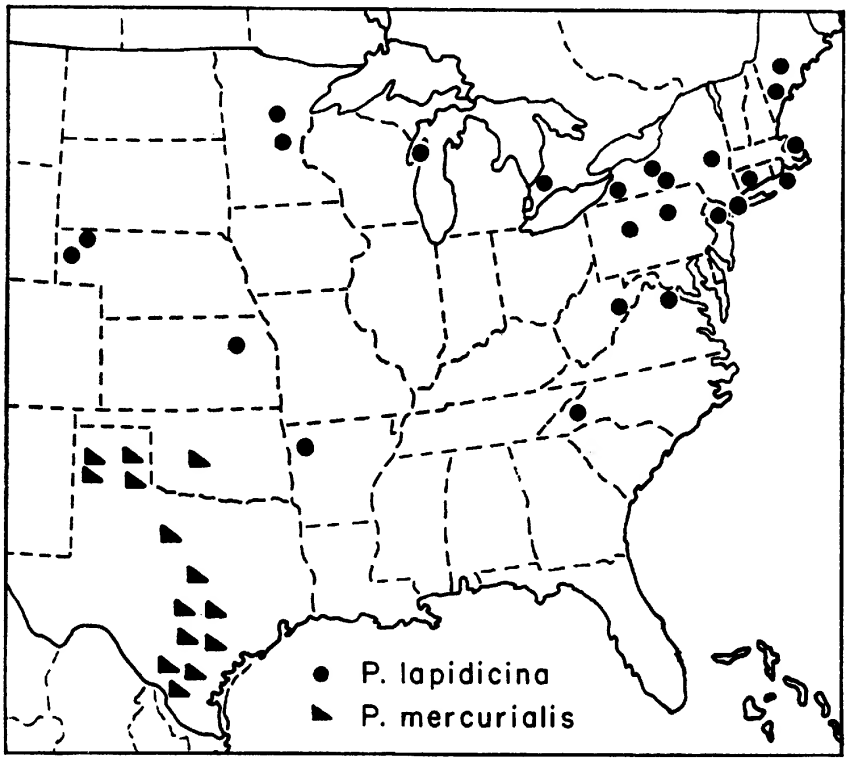


FIG. 1. Distribution of *Pardosa lapidicina* and *mercurialis*.

Pardosa texana BANKS, 1904, Jour. New York Ent. Soc., vol. 12, no. 2, p. 115, pl. 5, fig. 4.

MEASUREMENTS: Total length: males, 6.56 mm. to 8.78 mm.; females, 6.93 mm. to 9.33 mm. Of a male from Chickasha, Oklahoma: Total length, 6.93 mm.; carapace: length, 3.00 mm., width, 2.41 mm., height, 1.22 mm.; sternum: length, 1.59 mm., width, 1.30 mm.; patella-tibia: first leg, 4.63 mm., second leg, 4.33 mm., third leg, 3.15 mm., fourth leg, 5.15 mm. Of a female from Chickasha, Oklahoma: Total length, 7.47 mm.; carapace: length, 4.44 mm., width, 2.70 mm., height, 3.04 mm.; sternum: length, 1.70 mm., width, 1.30 mm.; patella-tibia: first leg, 5.07 mm., second leg, missing, third leg, 4.74 mm., fourth leg, 5.81 mm.

Structure and coloration are typical.

The male palp is very similar to that of *lapidicina* but differs in having the median accessory process in the form of a pointed tooth (fig. 12, M) rather than being spatulate. In the unexpanded palp (fig. 15) this process is conspicuous and often appears curved upward and

laterally. As in *lapidicina* the median apophysis has a more or less flattened upper surface when viewed ventrally.

The female epigynum of *mercurialis* is indistinguishable from that of *lapidicina* and displays the same range of variation described for the latter species. Without knowledge of the locality from which the specimen was taken, females of the two species cannot be separated. The difference appearing in figures 9 and 14 are individual differences. Often the posterior rim of the epigynum in *mercurialis* displays a break on each side before reaching its lateral limits (fig. 14), but this is not a reliable diagnostic feature. In specimens in which the upper rim of the transverse portion of the epigynum is distinctly sclerotized and at right angles to the longitudinal portion, the epigynum is identical to that of *Pardosa steva* (figs. 28, 32). This poses an additional problem in the separation of these two species. Although there are at present no records of overlap in the ranges of *Pardosa mercurialis* and *Pardosa steva,* the two species certainly have a common boundary in middle or western Texas.

TYPE LOCALITY: Austin, Texas, male type in the American Museum of Natural History.

DISTRIBUTION: This species occurs in Kansas and Oklahoma, and is known from many localities in the Panhandle and eastern half of Texas, where it apparently replaces *Pardosa lapidicina* (see fig. 1).

Pardosa vadosa, *new species*

Figures 2, 16–19

MEASUREMENTS: Total length: males, 6.11 mm. to 7.48 mm.; females, 2.93 mm. to 9.33 mm. Of a male from Virgin Narrows, Arizona: Total length, 6.48 mm.; carapace: length, 2.78 mm., width, 2.15 mm., height, 1.00 mm.; sternum: length, 1.44 mm., width, 1.15 mm.; patella-tibia: first leg, 4.30 mm., second leg, 3.15 mm., third leg, 2.96 mm., fourth leg, 4.81 mm. Of a female from Virgin Narrows, Arizona: Total length, 7.59 mm.; carapace: length, 3.16 mm., width, 2.52 mm., height, 1.15 mm.; sternum: length, 1.48 mm., width, 1.30 mm.; patella-tibia: first leg, 4.78 mm., second leg, 4.44 mm., third leg, 4.41 mm., fourth leg, 5.44 mm.

Coloration typical, although most specimens are light brown in color. Sternum pale or dusky. Structure typical.

The median accessory process of the male palpal organ is in the form of a conspicuous curved tooth (figs. 16, 19). It is very much larger than that of *mercurialis,* located higher on the bulb, and completely visible in the unexpanded palp. The conductor is a simple fold, and

the lateral accessory process is in the form of a spur; neither is visible unless the palp is expanded. The upper surface of the median apophysis is relatively flat.

The epigynum of the female (figs. 17, 18) is distinct from that of *lapidicina* and *mercurialis* in having the transverse portion occupying one-half of the total length as well as in having the upper rim of the transverse portion relatively distinct and more or less at right angles to the longitudinal portion of the epigynum. This type of epigynum also occurs in *Pardosa tumida* and *fallax*, and the females of these three species cannot be separated with certainty. The differences in details between figures 17, 22, and 25 are largely individual variations rather than specific differences.

TYPE LOCALITY: Male holotype, female allotype, and male and female paratypes from Virgin Narrows, Arizona.

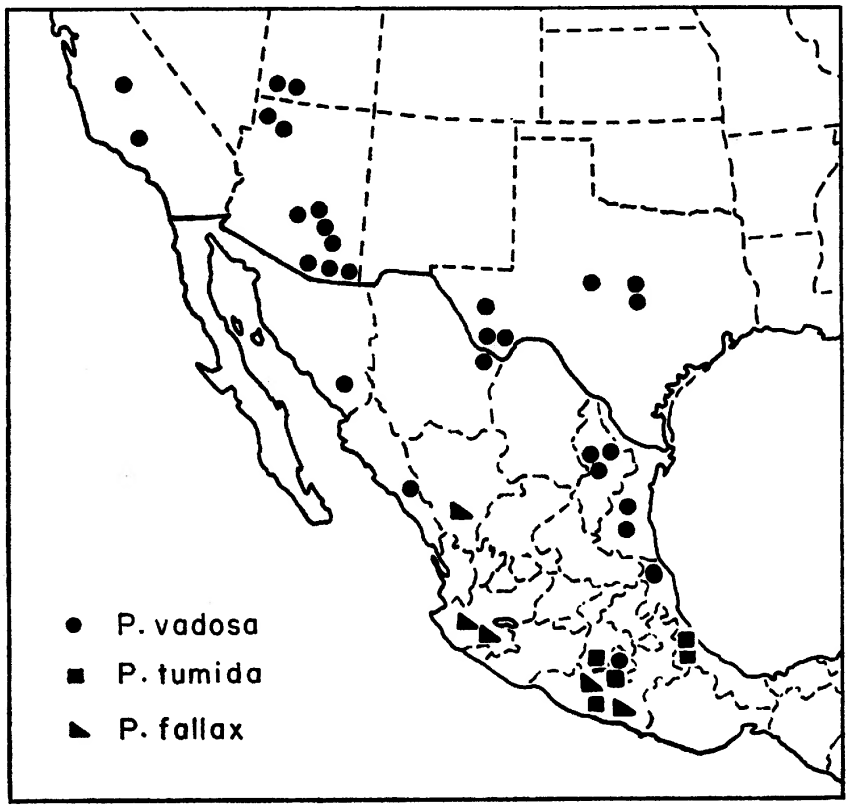


FIG. 2. Distribution of *Pardosa vadosa, tumida,* and *fallax.*

DISTRIBUTION: *Pardosa vadosa* is widely distributed throughout the southwestern portion of the United States and in Mexico from southern California to the middle of Texas and from Utah to central Mexico (see fig. 2). On the basis of present records it does not overlap *mercurialis* in range. Because *Pardosa tumida* and *fallax* are apparently confined to Mexico, isolated females from the United States can be assigned to *vadosa* with reasonable certainty. In Mexico they can be placed only in the *vadosa-tumida-fallax* group, although probably the majority belong to *Pardosa vadosa*.

Pardosa fallax, new species

Figures 2, 20–22

MEASUREMENTS: Total length: males, 6.00 mm. to 7.66 mm.; females, 6.41 mm. to 8.96 mm. Of a male from Nombre de Dios, Durango, Mexico: Total length, 6.19 mm.; carapace: length, 2.89 mm., width, 2.15 mm., height, 1.11 mm.; sternum: length, 1.41 mm., width, 1.00 mm.; patella-tibia: first leg, 4.33 mm., second leg, 3.15 mm., third leg, 3.04 mm., fourth leg, 4.82 mm. Of a female from Nombre de Dios, Durango, Mexico: Total length, 6.41 mm.; carapace: length, 2.56 mm., width, 2.15 mm., height, 1.11 mm.; sternum: length, 1.41 mm., width, 1.11 mm.; patella-tibia: first leg, 3.19 mm., second leg, 2.96 mm., third leg, 3.04 mm., fourth leg, 5.00 mm.

Color and structure are typical.

The male palp (figs. 20–21) is similar to that of *Pardosa vadosa* in having a large, curved, tooth-shaped, median, accessory process; however, unlike *vadosa*, the base of the process is covered by a large conspicuous ridge in the unexpanded palp. The conductor is a simple fold, and the lateral accessory process is in the form of a spur; both are invisible unless the palp is expanded.

The female epigynum is of the same type as that of *vadosa* and *tumida*, and isolated females cannot be separated with certainty.

TYPE LOCALITY: Male holotype, female allotype, and male and female paratypes from Nombre de Dios, Durango, Mexico.

DISTRIBUTION: In addition to the type locality, *Pardosa fallax* occurs in the Mexican states of Jalisco and Guerrero (see fig. 2).

Pardosa tumida, new species

Figures 2, 23–25

MEASUREMENTS: Total length: males, 6.00 mm. to 7.00 mm.; females, 7.11 mm. to 8.56 mm. Of male holotype, from Tierra Colorado, Veracruz, Mexico: Total length, 6.04 mm.; carapace: length, 2.63 mm.,

width, 2.04 mm., height, 1.30 mm.; sternum: length, 1.30 mm., width, 1.11 mm.; patella-tibia: first leg, 2.96 mm., second leg, 2.89 mm., third leg, 2.82 mm., fourth leg, 4.70 mm. Of female allotype, from Tierra Colorado, Veracruz, Mexico: Total length, 7.48 mm.; carapace: length, 3.15 mm., width, 2.44 mm., height, 0.93 mm.; sternum: length, 1.67 mm., width, 1.30 mm.; patella-tibia: first leg, 4.63 mm., second leg, 4.33 mm., third leg, 4.67 mm., fourth leg, 5.44 mm.

Coloration and structure are typical.

The male palpal organ (figs. 23, 24) is similar to that of *Pardosa mercurialis* in the form of the conductor and the median accessory process, but the tibia is unique in being enormously swollen, and the tarsus is relatively small. Males of *Pardosa tumida* are easily distinguished from all other members of the *lapidicina* complex.

The female epigynum (fig. 25) is essentially the same as in *Pardosa vadosa* and *fallax*, and isolated females cannot be identified with certainty.

TYPE LOCALITY: Male holotype, female allotype, and male and female paratypes from Tierra Colorado, Veracruz, Mexico.

DISTRIBUTION: *Pardosa tumida* is known only from four localities in central Mexico (see fig. 2).

Pardosa valens, new species

Figures 3, 29–30, 33

Pardosa sabulosa GERTSCH, 1934, Amer. Mus. Novitates, no. 693, p. 19.

MEASUREMENTS: Total length: males, 6.81 mm. to 8.04 mm.; females, 7.11 mm. to 9.33 mm. Of a male from White Mountain Reservation, near McNary, Arizona: Total length, 7.11 mm.; carapace: length, 3.15 mm., width, 2.59 mm., height, 1.48 mm.; sternum: length, 1.56 mm., width, 1.22 mm., patella-tibia: first leg, 4.41 mm., second leg, 4.41 mm., third leg, 4.22 mm., fourth leg, 5.33 mm. Of a female from White Mountain Reservation, near McNary, Arizona: Total length, 7.85 mm.; carapace: length, 4.33 mm., width, 2.59 mm., height, 1.11 mm.; sternum: length, 1.70 mm., width, 1.30 mm.; patella-tibia: first leg, 4.70 mm., second leg, 4.63 mm., third leg, 4.41 mm., fourth leg, 5.26 mm.

Pardosa valens is more or less typical in structure, although it averages a little larger than most of the other members of the *lapidicina* group. The coloration tends towards deep mahogany, with a very distinct pattern. The male palp, unlike that of any other member of the complex, is thickly clothed with jet black hairs.

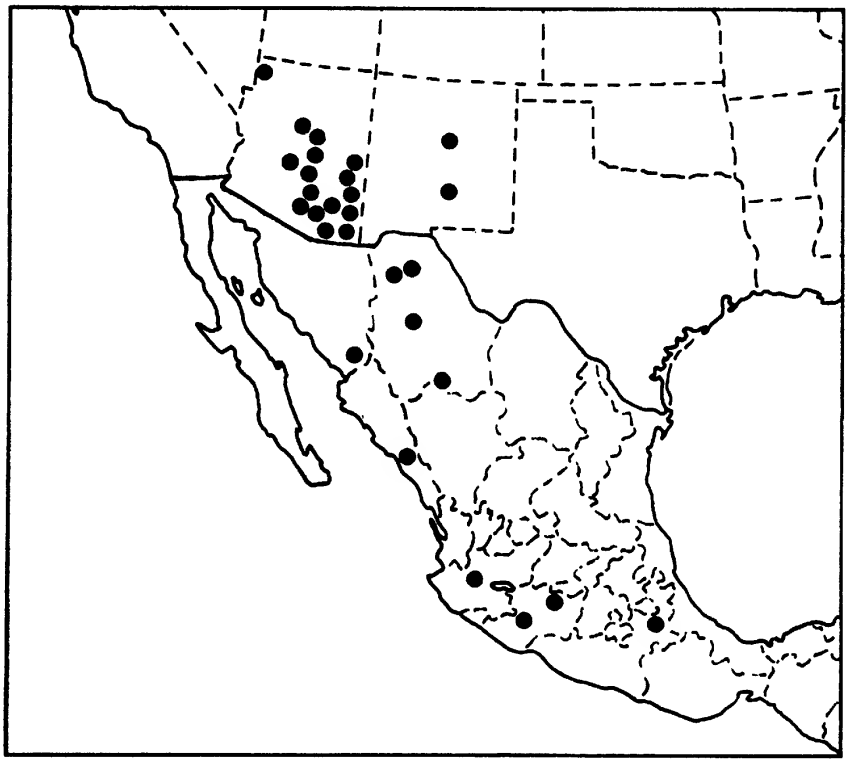


FIG. 3. Distribution of *Pardosa valens.*

The tibia of the male palp (fig. 31) is somewhat enlarged but is not nearly so swollen as in *Pardosa tumida.* The palpal organ (fig. 30) is very dark and highly sclerotized. The median apophysis is short, with the dorsal surface forming a 180-degree arc. The conductor is visible as a small denticle, but its peculiar shape is revealed only when the palp is expanded. Its actual shape is that of a pointed tooth (fig. 29, C), with an odd paddle-like extension projecting laterally away from the tip of the embolus. The median and lateral accessory processes are both in the form of teeth, but are usually inconspicuous in the unexpanded palp.

Females of *valens* have a very distinct epigynum (fig. 33), and they can be easily separated from other members of the *lapidicina* group. It is the only species in which the median ridge or guide arises from a short and relatively narrow triangular base.

TYPE LOCALITY: Male holotype, female allotype, and male and female paratypes from Prescott, Arizona.

DISTRIBUTION: This species has been recorded from numerous localities in Arizona as well as from New Mexico and Mexico as far south as Jalisco (see fig. 3).

Pardosa steva Lowrie and Gertsch

Figures 4, 26–28, 32

Pardosa steva LOWRIE AND GERTSCH, 1955, Amer. Mus. Novitates, no. 1736, p. 8, figs. 4, 5, 9.

MEASUREMENTS: Total length: males, 5.81 mm. to 8.41 mm.; females, 6.74 mm. to 8.78 mm. Of a male from Patagonia, Arizona: Total length, 6.00 mm.; carapace: length, 2.41 mm., width, 1.85 mm., height, 0.93 mm.; sternum: length, 1.19 mm., width, 1.04 mm.; patella-tibia: first leg, 2.67 mm., second leg, 2.59 mm., third leg, 2.59 mm., fourth leg, 4.33 mm. Of a female from Patagonia, Arizona: Total length, 6.74 mm.; carapace: length, 2.22 mm., width, 1.85 mm., height, 0.74 mm.; sternum: length, 1.22 mm., width, 0.96 mm.; patella-tibia: first leg, 2.67 mm., second leg, 2.52 mm., third leg missing, fourth leg, 2.59 mm.

The structure is typical, and the color varies from dark to very light.

The male palpal organ (figs. 26, 27) shows similarities to that of *mercurialis*. The conductor is a spur that is invisible in the unexpanded palp. The median accessory process is often, but not always, visible as a large tooth with a wide base located at the lateral rim of the alveolus. Its actual shape is that of a flat curved tooth (fig. 27, M) the apex of which is pointed towards the embolus. The lateral accessory process is in the form of a small tooth and is sometimes visible above the median process (fig. 26). The most conspicuous feature of the unexpanded palp is a long ridge that appears to oppose and flank the tip of the embolus. The median apophysis of the male palp is relatively pointed and flat above.

The female epigynum (figs. 28, 32) is characterized by having the transverse portion restricted to only one-third to one-quarter of the total length of the epigynal plate. The transverse portion is deeply and evenly excavated, and its floor lies distinctly below that of the longitudinal section. The upper rim of the transverse section is usually distinct and may be at right angles or at a slightly acute angle to the upper longitudinal portion. The median ridge may extend any distance beyond the transverse portion. A curved groove may be visible on the floor of the transverse portion on each side of the median ridge as is characteristic of *Pardosa sierra*. However, in *sierra* the transverse portion never occupies less than one-half of the total length of the epigynum.

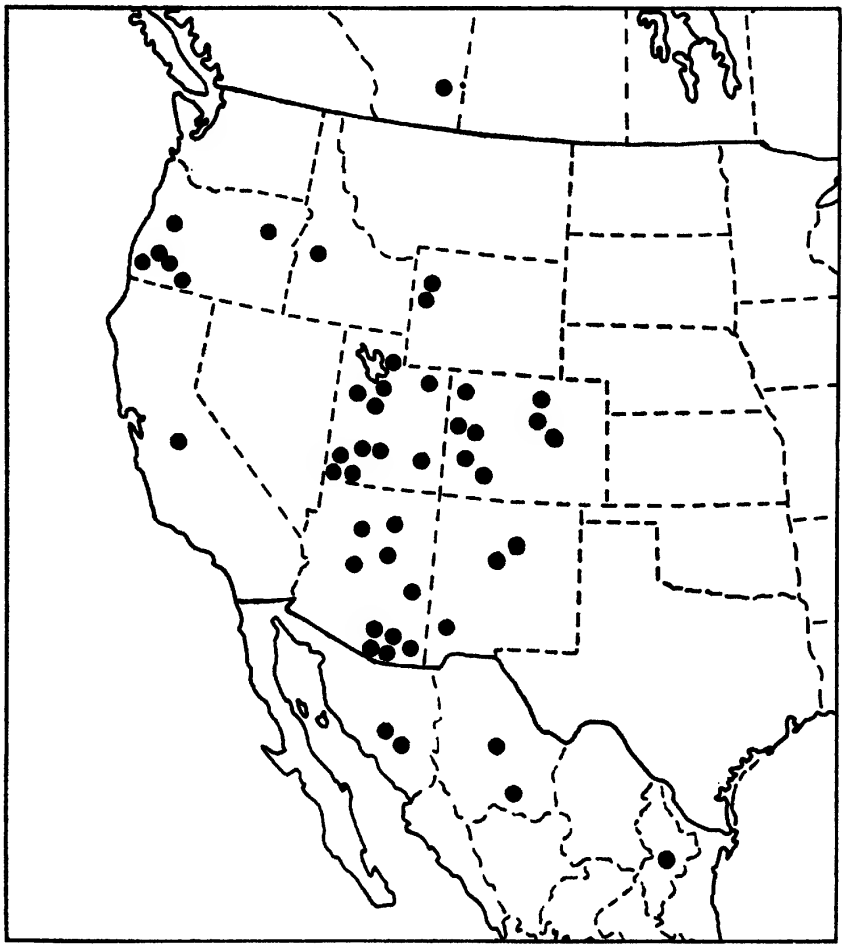


FIG. 4. Distribution of *Pardosa steva.*

TYPE LOCALITY: Pilgrim Creek, north of Moran, Wyoming, male holotype in the American Museum of Natural History.

DISTRIBUTION: On the basis of present records *Pardosa steva* is the most widely distributed western member of the *lapidicina* group. It ranges from Canada into Mexico and from Oregon and California through Colorado and Wyoming (see fig. 4). It undoubtedly has an eastern boundary with *Pardosa lapidicina* and replaces *lapidicina* in the western half of the United States.

Pardosa sierra Banks

Figures 5, 34–41

Pardosa sierra BANKS, 1898, Proc. California Acad. Sci., ser. 3, vol. 1, no. 7, p. 274, pl. 16, fig. 20. GERTSCH, 1934, Amer. Mus. Novitates, no. 693, p. 19. ROEWER, 1954, Katalog der Araneae, vol. 2, pt. A, p. 194. BONNET, 1958 Bibliographia araneorum, vol. 2, pt. 1, p. 3422.

Pardosa atromedia BANKS, 1904, Proc. California Acad. Sci., vol. 3, p. 355, pl. 39, fig. 32. PETRUNKEVITCH, 1911, Bull. Amer. Mus. Nat. Hist., vol. 29, p. 571 (in part).

Pardosa sura CHAMBERLIN AND IVIE, 1941, Bull. Univ. Utah, biol. ser., vol. 6, no. 3, p. 10, pl. 5, fig. 61.

MEASUREMENTS: Total length: males, 5.81 mm. to 7.67 mm.; females, 6.26 mm. to 9.33 mm. Of a male from Santa Monica, California: Total length, 7.00 mm.; carapace: length, 2.96 mm., width, 2.30 mm., height, 1.19 mm.; sternum: length, 1.48 mm., width, 1.15 mm.; patella-tibia: first leg, 4.70 mm., second leg, 3.00 mm., third leg, 4.33 mm., fourth leg, 4.33 mm. Of a female from Santa Monica, California: Total length, 9.33 mm.; carapace: length, 5.07 mm., width, 2.96 mm., height, 1.41 mm.; sternum: length, 1.74 mm., width, 1.48 mm.; patella-tibia: first leg, 5.44 mm., second leg, 5.15 mm., third leg, 5.07 mm., fourth leg, 6.19 mm.

The structure is typical, and the color ranges from very dark to very light.

The male palp is characterized by having the conductor sword-shaped and projecting upward. This process is sufficiently sclerotized and conspicuous to be distinctly visible in the unexpanded palp (figs. 34, 35, 37, 41). The conductor is somewhat variable in length and may be blunt (fig. 34) rather than pointed (figs. 35, 37). The median accessory process (figs. 38, M; 40, M) is much less conspicuous and is concealed or partially concealed by the conductor in the unexpanded palp. A sclerotized ridge (fig. 33, R) is often partially visible behind the conductor. In the unexpanded palp the conductor, plus the visible portion of this ridge and the median accessory process, give the appearance of three processes opposite the embolus. Not infrequently only the conductor is visible (fig. 41). These variations do not appear to be correlated with geographical distribution and probably should not be considered as having subspecific value.

The epigynum is relatively distinct (figs. 36, 39). The transverse portion occupies approximately one-half of the total length as in the *vadosa-fallax-tumida* group. It differs in having a pair of crescent-shaped troughs on the floor on each side of the transverse portion.

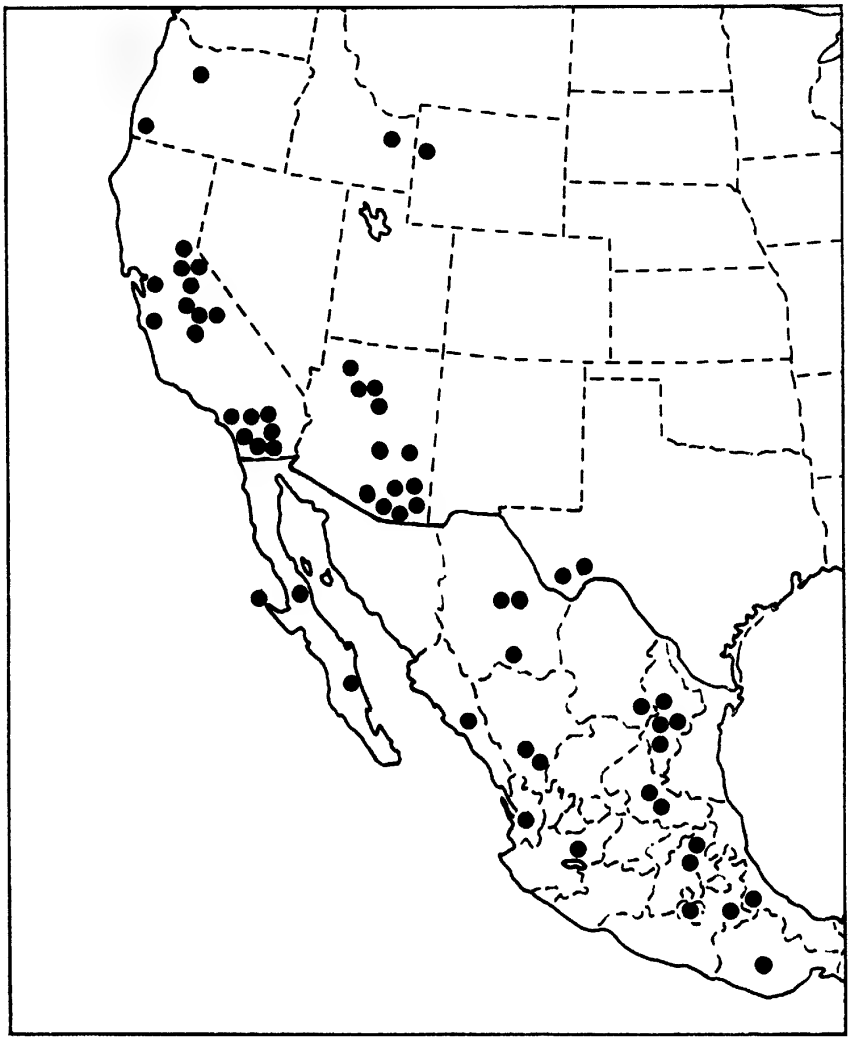


FIG. 5. Distribution of *Pardosa sierra.*

These troughs vary in degree of sclerotization and sometimes are obscure. Each half of the lower rim of the epigynum is evenly curved in most specimens (fig. 36), but in some females it takes the form of a sigmoid curve (fig. 39).

TYPE LOCALITY: Sierra Laguna, Baja California, Mexico, cotypes in the Museum of Comparative Zoölogy.

DISTRIBUTION: *Pardosa sierra* is a common western species of the

lapidicina group and ranges from California to Texas and south into Mexico (see fig. 5). Although its distribution overlaps that of *steva*, it apparently does not extend so far north or east as the latter.

Summary of the Phylogenetic Relationships Within the *lapidicina* Complex

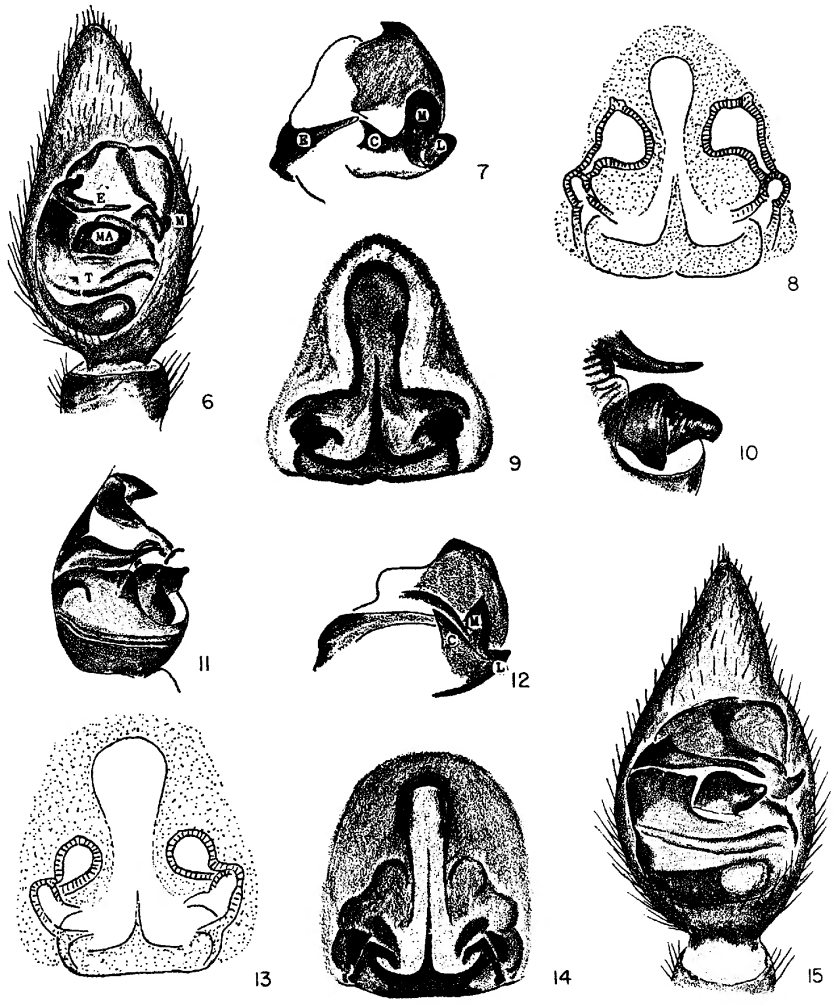
The members of the *lapidicina* complex fall into three groups based on the structure of the male palp. The first group, comprising *Pardosa lapidicina, mercurialis, tumida,* and *steva,* has an inconspicuous, weakly sclerotized conductor in the shape of a spur. In all members of this group the median accessory process is highly sclerotized and conspicuous in the unexpanded palp. Except for *tumida,* the female epigynum has the transverse portion occupying less than one-half of the total length of the epigynum. The combined distribution of these four species covers the North American continent without any overlap in individual ranges.

As is mentioned above, males of *lapidicina* from Kansas and Arkansas display a less flattened and more tooth-shaped median accessory process than is found in specimens in the more eastern part of its range. When new material from Louisiana and eastern Texas becomes available for study, it is possible that *mercurialis* may have to be placed as a subspecies of *lapidicina.*

In the second group the conductor is a long, weakly sclerotized fold. The median accessory process is a large and conspicuous curved tooth. The transverse portion of the female epigynum occupies one-half of the total length. This group includes two species, *Pardosa vadosa* and *fallax*. The latter species is restricted to Mexico, while *vadosa* also occurs not only in Mexico but in the southwestern United States.

Pardosa valens and *sierra* comprise the third group of the *lapidicina* complex. In both species the conductor is strongly sclerotized, sword-shaped, and conspicuous.

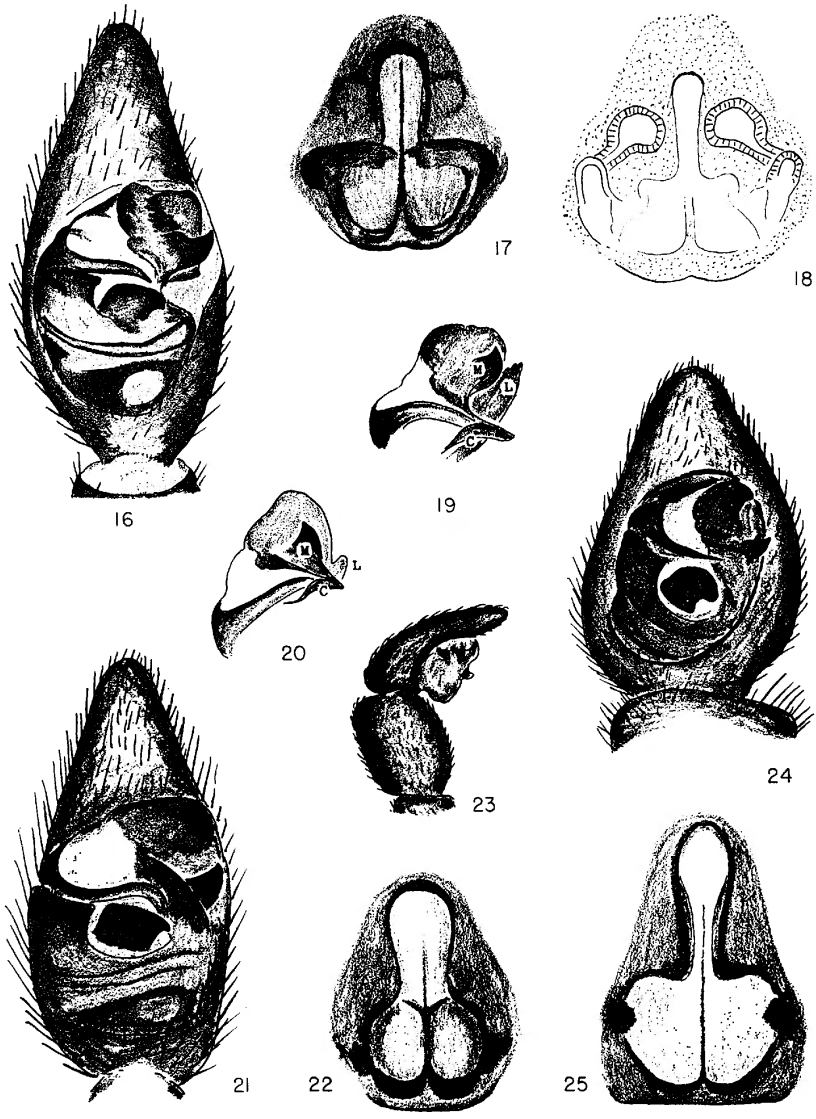
Both the second and third groups appear to show a closer relationship to the first group than they do to each other.



FIGS. 6–10. *Pardosa lapidicina* Emerton. 6. Left palpus of male, ventral view. 7. Upper part of expanded left male palpus. 8. Female genitalia, dorsal view. 9. Epigynum. 10. Median apophysis of left male palpus, lateral view.

FIGS. 11–15. *Pardosa mercurialis* Montgomery. 11. Left male palpus, lateral view. 12. Upper part of expanded left male palpus. 13. Female genitalia, dorsal view. 14. Epigynum. 15. Left male palpus, ventral view.

Abbreviations: C, conductor; E, embolus; L, lateral accessory process; M, median accessory process; MA, median apophysis; T, tegulum.

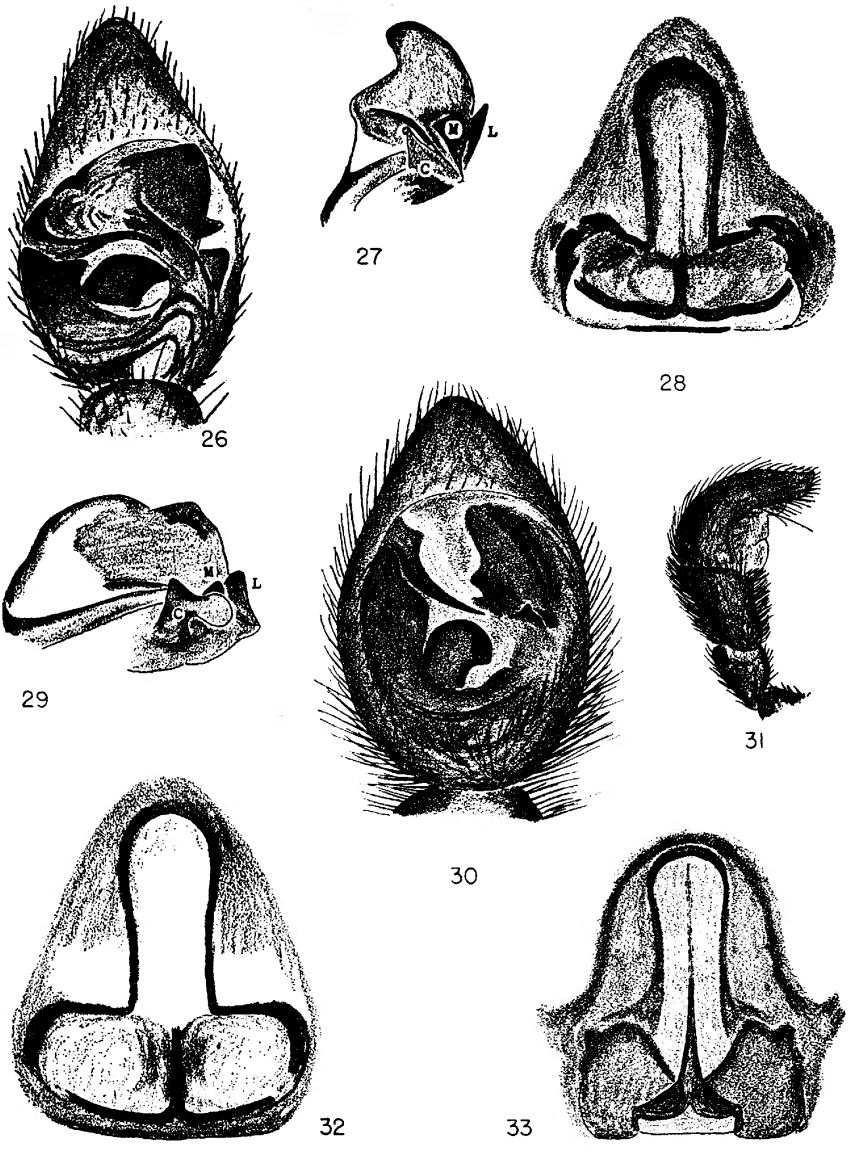


FIGS. 16–19. *Pardosa vadosa,* new species. 16. Left male palpus, ventral view. 17. Epigynum. 18. Female genitalia, dorsal view. 19. Upper part of expanded left male palpus.

FIGS. 20–22. *Pardosa fallax,* new species. 20. Upper part of expanded left male palpus. 21. Left male palpus, ventral view. 22. Epigynum.

FIGS. 23–25. *Pardosa tumida,* new species. 23. Tibia and tarsus of left male palpus. 24. Left male palpus, ventral view. 25. Epigynum.

Abbreviations: C, conductor; L, lateral accessory process; M, median accessory process.



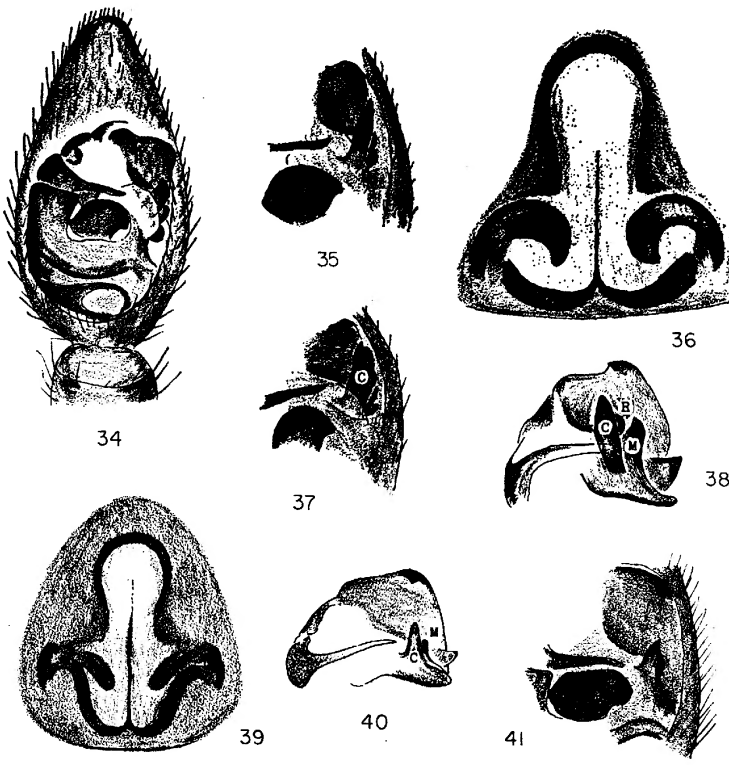
FIGS. 26–28. *Pardosa steva* Lowrie and Gertsch. 26. Left male palpus, ventral view. 27. Upper part of expanded left male palpus. 28. Epigynum.

FIGS. 29–31. *Pardosa valens*, new species. 29. Upper part of expanded left male palpus. 30. Left male palpus, ventral view. 31. Tibia and tarsus of left male palpus, lateral view.

FIG. 32. *Pardosa steva* Lowrie and Gertsch, epigynum of another female.

FIG. 33. *Pardosa valens*, new species, epigynum of another female.

Abbreviations: C, conductor; L, lateral accessory process; M, median accessory process.



FIGS. 34–41. *Pardosa sierra* Banks. 34. Left palpus of male from Santa Monica, California, ventral view. 35. Upper part of left palpus of male from Chisos Mountains, Texas, ventral view. 36. Epigynum of female from Sierra City, California. 37. Upper part of left palpus of male from Chisos Mountains, Texas, ventral view. 38. Upper part of expanded left palpus of male from Chisos Mountains, Texas. 39. Epigynum of female from Baja California, Mexico. 40. Upper part of expanded left palpus of male from San Diego, California. 41. Upper part of left palpus of male from La Grange, California, ventral view.

Abbreviations: C, conductor; M, median accessory process; R, ridge.